

REMARKS/ARGUMENTS

In the specification, paragraph [0054] has been amended to correct a typographical error.

Claim 6 has been cancelled (deleted) rendering moot the objection thereto.

Claims 18-22 and 24 remaining in this application. Claims 1-7 and 23 have been canceled (deleted).

The cancellation of claims 1-7 render moot the Examiner's objections thereto.

Claims 8, 12, 13, 14, 18, and 20 had been rejected under 35 USC 103 is being unpatentable over Buynoski '088 and view of Weber '416 further in view of the Lee et al '752. The Examiner maintains that Buynoski teaches providing a semiconductor device having at least two metal interconnect layers having low dielectric constant material between the metal interconnect layers citing column 5, lines 45-59 in Figs. 1-4. The Examiner acknowledges that Buynoski does not teach etching the device with an aqueous solution of HF and HCl.

The Examiner maintains that Weber teaches that HCl and HF tend to preferentially etch the interface region between a metal electrode and a substrate such as a polyamide (in maintaining that the polyamide is a low dielectric constant material) citing columns 4, lines 21-24 and maintains that Weber reads on etching a semiconductor device in the aqueous solution of HCl and HF.

The Examiner maintains that Lee teaches a structure (electronic) is then etched in a wet etchant such that it may be observed in the scanning electron microscope for study of the characteristic features or defect and its reason for being defective citing column 2, lines 52-54.

However, the Examiner's reading and interpretation of Weber is erroneous, which makes the rejection fatally defective. The Weber teaches anodically etching a metal layer using

electrolytes solution including ammonium hydroxide. All of the examples in Weber are directed to this invention. The only exception is the one paragraph cited by the Examiner. However, the Examiner's attention is respectfully directed to column 4, lines 17-28. Weber states:

"Hydrochloric and hydrofluoric acid are volatile electrolytes which are incompatible for use in some applications of the subject invention." Weber states that each of hydrochloric and hydrofluoric are volatile electrolytes. Weber does not teach etching with an aqueous solution of hydrochloric acid and hydrofluoric acid. The Weber states: "hydrochloric acid and hydrofluoric acid tend to preferentially etch the interface region between a metal electrode and a substrate such as polyamide." It is unclear what the "interface region" between the metal lot electrode and the substrate is, nor is it clear what exactly is etched. Clearly Weber does not disclose etching a low dielectric constant material with an aqueous solution of hydrochloric acid and hydrofluoric acid. Nor does Weber teach etching a low dielectric constant material between two metal interconnect layers has called for in claim 8. Applicant maintains that Weber does not teach etching the polyamide layer. At best, even if one would strain to interpret Weber as disclosing etching the polyimide layer, the etching process clearly stops on the polyamide layer.

Independent claim 8 as now amended clearly distinguishes over even a strained and speculative interpretation of the disclosure of Weber. Furthermore, since claim 8 is not anticipated under 35 USC 102, applicants point out the teaching away comments regarding "crazing" made in column 4, lines 26-28. A person of ordinary skill in the art would not be motivated to combine or modify Buynoski in view of Weber in the face of these teaching away comments.

Although Buynoski may teach two metal interconnect layers with a low dielectric constant material therebetween, one cannot ignore the teaching away effect set forth in the

paragraph bridging columns 4 and 5, which discloses that a low dielectric constant material (BCB) should be etched with a mixed oxygen-fluorine plasma. As such, Buynosky actually teaches away from etching a low dielectric material with an aqueous solution of hydrochloric acid and hydrofluoric acid. There's no motivation in any of the references to modify Weber or Buynosky to arrive at applicants claimed invention, nor is there any teaching in the prior art to provide a person of ordinary skill in the art with a reasonable expectation of success if such modification were made. Other references of record also teach away from applicants claimed invention. Asam teaches etching with hydrofluoric acid. Bard et al teach etching a polyimide with the solution of metal hydroxide. Lee doesn't overcome the deficiencies of Weber or Buynosky, or the teaching away effect of Buynosky, Asam and Bard et al.

Claims 9 and 17 have been rejected under 35 USC 103 is being unpatentable over Buynoski in view of Weber and Lee as applied to claim 8 and further in view of Asam. The Examiner maintains that Asam teaches the etching step may be controlled by regulating etchant concentration. However, since Weber fails to disclose applicants claimed etching solution comprising an aqueous solution of HCl and HF, then there is no identified "result effective variable" to be optimized. Furthermore, the teaching away effects of the numerous references of record, including Asam, cannot be overlooked in hindsight to identify a "result effective variable" and simply conclude that optimization thereof would have been within the skill of a person in the art.

Claims 10, 11 and 19 had been rejected under 35 USC 103 is being unpatentable over Buynosky in view of Weber and Lee as applied to claim 8, and further in view of Tobben. The Examiner has taken the positioned that in the would have been obvious to modify Buynosky with


the methyl silsesquioxane disclosed in Tobben. However, Tobben teaches etching the dielectric layer 112 with a conventional reactive ion etching process, see column 4, lines 48-15. Even if there is motivation to substitute dielectric layers, a person of ordinary skill in the art would not ignore the teaching away statements of Tobben with regard to etching techniques.

Claims 15 and 16 were rejected under 35 USC 103 as being unpatentable over Buynosky in view of Weber and Lee as applied to claim 8 and further in view of Gardner. Although Gardner teaches a variety of low dielectric layers, the addition of this reference cannot overcome the deficiencies of Weber and the teaching away effects of numerous references relied on the Examiner.

Independent claim 21 has been amended in a manner similar to claim 8 and is patentable for the same reasons stated above. Claim 22 now depends from claim 8 and the prior rejection thereof is rendered moot.

In view of the above amendments and remarks, applicants respectfully request reconsideration and allowance of the claims now the case.

Respectfully submitted



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